

MC78XXE/LM78XXE/MC78XXAE

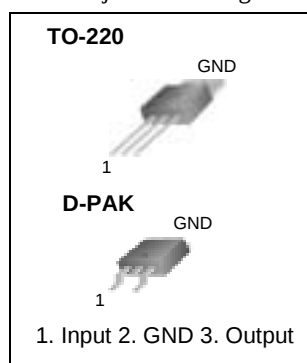
3-Terminal 1A Positive Voltage Regulator

Features

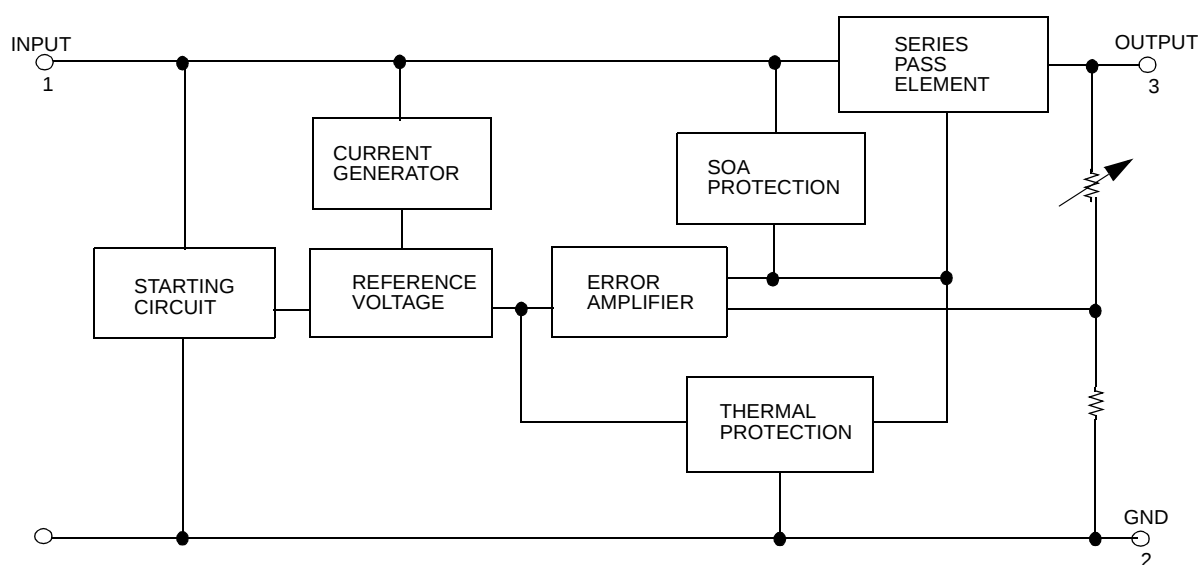
- Output Current up to 1A
- Output Voltages of 5, 6, 8, 9, 12, 15, 18, 24V
- Thermal Overload Protection
- Short Circuit Protection
- Output Transistor Safe Operating Area Protection

Description

The MC78XXE/LM78XXE/MC78XXAE series of three terminal positive regulators are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications. Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.



Internal Block Diagram



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Input Voltage (for $V_O = 5V$ to $18V$) (for $V_O = 24V$)	V_I V_I	35 40	V V
Thermal Resistance Junction-Cases (TO-220)	$R_{\theta JC}$	5	°C/W
Thermal Resistance Junction-Air (TO-220)	$R_{\theta JA}$	65	°C/W
Operating Temperature Range	T_{OPR}	0 ~ +125	°C
Storage Temperature Range	T_{STG}	-65 ~ +150	°C

Electrical Characteristics (MC7805E/LM7805E)

(Refer to test circuit ,0°C < T_J < 125°C, $I_O = 500mA$, $V_I = 10V$, $C_I = 0.33\mu F$, $C_O = 0.1\mu F$, unless otherwise specified)

Parameter	Symbol	Conditions	MC7805E/LM7805E			Unit
			Min.	Typ.	Max.	
Output Voltage	V_O	$T_J = +25^\circ C$	4.8	5.0	5.2	V
		$5.0mA \leq I_O \leq 1.0A$, $P_O \leq 15W$ $V_I = 7V$ to $20V$	4.75	5.0	5.25	
Line Regulation (Note1)	Regline	$T_J = +25^\circ C$	$V_O = 7V$ to $25V$		-	mV
			$V_I = 8V$ to $12V$		-	
Load Regulation (Note1)	Regload	$T_J = +25^\circ C$	$I_O = 5.0mA$ to $1.5A$		-	mV
			$I_O = 250mA$ to $750mA$		-	
Quiescent Current	I_Q	$T_J = +25^\circ C$	-	5.0	8.0	mA
Quiescent Current Change	ΔI_Q	$I_O = 5mA$ to $1.0A$	-	0.03	0.5	mA
		$V_I = 7V$ to $25V$	-	0.3	1.3	
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5mA$	-	-0.8	-	mV/°C
Output Noise Voltage	V_N	$f = 10Hz$ to $100kHz$, $T_A = +25^\circ C$	-	42	-	$\mu V/V_O$
Ripple Rejection (Note2)	RR	$f = 120Hz$ $V_O = 8V$ to $18V$	62	73	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1A$, $T_J = +25^\circ C$	-	2	-	V
Output Resistance (Note2)	r_O	$f = 1kHz$	-	15	-	m Ω
Short Circuit Current	I_{SC}	$V_I = 35V$, $T_A = +25^\circ C$	-	230	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^\circ C$	-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7806E) (Continued)(Refer to test circuit , $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 11\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions		MC7806E			Unit
				Min.	Typ.	Max.	
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$		5.75	6.0	6.25	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 8.0\text{V}$ to 21V		5.7	6.0	6.3	
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 8\text{V}$ to 25V	-	5	120	mV
			$V_I = 9\text{V}$ to 13V	-	1.5	60	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA}$ to 1.5A	-	9	120	mV
			$I_O = 250\text{mA}$ to 750mA	-	3	60	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$		-	5.0	8.0	mA
Quiescent Current Change	ΔI_Q	$I_O = 5\text{mA}$ to 1A		-	-	0.5	mA
		$V_I = 8\text{V}$ to 25V		-	-	1.3	
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-	-0.8	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz}$ to 100kHz , $T_A = +25^{\circ}\text{C}$		-	45	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ $V_I = 9\text{V}$ to 19V		59	75	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$		-	2	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$		-	19	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$		-	250	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$		-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7808E) (Continued)(Refer to test circuit , $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 14\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions		MC7808E			Unit
				Min.	Typ.	Max.	
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$		7.7	8.0	8.3	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 10.5\text{V to } 23\text{V}$		7.6	8.0	8.4	
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 10.5\text{V to } 25\text{V}$	-	5.0	160	mV
			$V_I = 11.5\text{V to } 17\text{V}$	-	2.0	80	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5.0\text{mA to } 1.5\text{A}$	-	10	160	mV
			$I_O = 250\text{mA to } 750\text{mA}$	-	5.0	80	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$		-	5.0	8.0	mA
Quiescent Current Change	ΔI_Q	$I_O = 5\text{mA to } 1.0\text{A}$		-	0.05	0.5	mA
		$V_I = 10.5\text{A to } 25\text{V}$		-	0.5	1.0	
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-	-0.8	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$		-	52	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$, $V_I = 11.5\text{V to } 21.5\text{V}$		56	73	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$		-	2	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$		-	17	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$		-	230	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$		-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7809E) (Continued)(Refer to test circuit , $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 15\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions		MC7809E			Unit
				Min.	Typ.	Max.	
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$		8.65	9	9.35	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 11.5\text{V to } 24\text{V}$		8.6	9	9.4	
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 11.5\text{V to } 25\text{V}$	-	6	180	mV
			$V_I = 12\text{V to } 17\text{V}$	-	2	90	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	-	12	180	mV
			$I_O = 250\text{mA to } 750\text{mA}$	-	4	90	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$		-	5.0	8.0	mA
Quiescent Current Change	ΔI_Q	$I_O = 5\text{mA to } 1.0\text{A}$		-	-	0.5	mA
		$V_I = 11.5\text{V to } 26\text{V}$		-	-	1.3	
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-	-1	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$		-	58	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ $V_I = 13\text{V to } 23\text{V}$		56	71	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$		-	2	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$		-	17	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$		-	250	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$		-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7812E) (Continued)(Refer to test circuit , $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 19\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions		MC7812E			Unit
				Min.	Typ.	Max.	
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$		11.5	12	12.5	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 14.5\text{V to } 27\text{V}$		11.4	12	12.6	
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{V to } 30\text{V}$	-	10	240	mV
			$V_I = 16\text{V to } 22\text{V}$	-	3.0	120	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	-	11	240	mV
			$I_O = 250\text{mA to } 750\text{mA}$	-	5.0	120	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$		-	5.1	8.0	mA
Quiescent Current Change	ΔI_Q	$I_O = 5\text{mA to } 1.0\text{A}$		-	0.1	0.5	mA
		$V_I = 14.5\text{V to } 30\text{V}$		-	0.5	1.0	
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-	-1	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$		-	76	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ $V_I = 15\text{V to } 25\text{V}$		55	71	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$		-	2	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$		-	18	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$		-	230	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$		-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7815E) (Continued)(Refer to test circuit , $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 23\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions		MC7815E			Unit
				Min.	Typ.	Max.	
Output Voltage	VO	TJ =+25°C		14.4	15	15.6	V
		5.0mA ≤ IO ≤ 1.0A, PO ≤ 15W VI = 17.5V to 30V		14.25	15	15.75	
Line Regulation (Note1)	Regline	TJ = +25°C	VI = 17.5V to 30V	-	11	300	mV
			VI = 20V to 26V	-	3	150	
Load Regulation (Note1)	Regload	TJ = +25°C	IO = 5mA to 1.5A	-	12	300	mV
			IO = 250mA to 750mA	-	4	150	
Quiescent Current	IQ	TJ =+25°C		-	5.2	8.0	mA
Quiescent Current Change	ΔIQ	IO = 5mA to 1.0A		-	-	0.5	mA
		VI = 17.5V to 30V		-	-	1.0	
Output Voltage Drift (Note2)	ΔVO/ΔT	IO = 5mA		-	-1	-	mV/°C
Output Noise Voltage	VN	f = 10Hz to 100kHz, TA = +25°C		-	90	-	μV/VO
Ripple Rejection (Note2)	RR	f = 120Hz VI = 18.5V to 28.5V		54	70	-	dB
Dropout Voltage	VDrop	IO = 1A, TJ=+25°C		-	2	-	V
Output Resistance (Note2)	ro	f = 1kHz		-	19	-	mΩ
Short Circuit Current	ISC	VI = 35V, TA = +25°C		-	250	-	mA
Peak Current (Note2)	IPK	TJ =+25°C		-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7818E) (Continued)(Refer to test circuit ,0°C < T_J < 125°C, I_O = 500mA, V_I = 27V, C_I = 0.33μF, C_O = 0.1μF, unless otherwise specified)

Parameter	Symbol	Conditions		MC7818E			Unit
				Min.	Typ.	Max.	
Output Voltage	V _O	T _J = +25°C		17.3	18	18.7	V
		5.0mA ≤ I _O ≤ 1.0A, P _O ≤ 15W V _I = 21V to 33V		17.1	18	18.9	
Line Regulation (Note1)	Regline	T _J = +25°C	V _I = 21V to 33V	-	15	360	mV
			V _I = 24V to 30V	-	5	180	
Load Regulation (Note1)	Regload	T _J = +25°C	I _O = 5mA to 1.5A	-	15	360	mV
			I _O = 250mA to 750mA	-	5.0	180	
Quiescent Current	I _Q	T _J = +25°C		-	5.2	8.0	mA
Quiescent Current Change	ΔI _Q	I _O = 5mA to 1.0A		-	-	0.5	mA
		V _I = 21V to 33V		-	-	1	
Output Voltage Drift (Note2)	ΔV _O /ΔT	I _O = 5mA		-	-1	-	mV/°C
Output Noise Voltage	V _N	f = 10Hz to 100kHz, T _A = +25°C		-	110	-	μV/V _O
Ripple Rejection (Note2)	RR	f = 120Hz V _I = 22V to 32V		53	69	-	dB
Dropout Voltage	V _{Drop}	I _O = 1A, T _J = +25°C		-	2	-	V
Output Resistance (Note2)	r _O	f = 1kHz		-	22	-	mΩ
Short Circuit Current	I _{SC}	V _I = 35V, T _A = +25°C		-	250	-	mA
Peak Current (Note2)	I _{PK}	T _J = +25°C		-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7824E) (Continued)(Refer to test circuit , $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 500\text{mA}$, $V_I = 33\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions		MC7824E			Unit
				Min.	Typ.	Max.	
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$		23	24	25	V
		$5.0\text{mA} \leq I_O \leq 1.0\text{A}$, $P_O \leq 15\text{W}$ $V_I = 27\text{V to } 38\text{V}$		22.8	24	25.25	
Line Regulation (Note1)	Regline	$T_J = +25^{\circ}\text{C}$	$V_I = 27\text{V to } 38\text{V}$	-	17	480	mV
			$V_I = 30\text{V to } 36\text{V}$	-	6	240	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$	$I_O = 5\text{mA to } 1.5\text{A}$	-	15	480	mV
			$I_O = 250\text{mA to } 750\text{mA}$	-	5.0	240	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$		-	5.2	8.0	mA
Quiescent Current Change	ΔI_Q	$I_O = 5\text{mA to } 1.0\text{A}$		-	0.1	0.5	mA
		$V_I = 27\text{V to } 38\text{V}$		-	0.5	1	
Output Voltage Drift (Note2)	$\Delta V_O / \Delta T$	$I_O = 5\text{mA}$		-	-1.5	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz to } 100\text{kHz}$, $T_A = +25^{\circ}\text{C}$		-	60	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$ $V_I = 28\text{V to } 38\text{V}$		50	67	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$		-	2	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$		-	28	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$		-	230	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$		-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Changes in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7805AE) (Continued)(Refer to the test circuits. $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 10\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$	4.9	5	5.1	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 7.5\text{V to } 20\text{V}$	4.8	5	5.2	
Line Regulation (Note1)	Regline	$V_I = 7.5\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	-	5	50	mV
		$V_I = 8\text{V to } 12\text{V}$	-	3	50	
		$T_J = +25^{\circ}\text{C}$	$V_I = 7.3\text{V to } 20\text{V}$	5	50	
			$V_I = 8\text{V to } 12\text{V}$	1.5	25	
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	-	9	100	mV
		$I_O = 5\text{mA to } 1\text{A}$	-	9	100	
		$I_O = 250\text{mA to } 750\text{mA}$	-	4	50	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$	-	5.0	6	mA
Quiescent Current Change	ΔI_Q	$I_O = 5\text{mA to } 1\text{A}$	-	-	0.5	mA
		$V_I = 8\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	-	-	0.8	
		$V_I = 7.5\text{V to } 20\text{V}$, $T_J = +25^{\circ}\text{C}$	-	-	0.8	
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-0.8	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 8\text{V to } 18\text{V}$	-	68	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	-	2	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$	-	17	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7806AE) (Continued)(Refer to the test circuits. $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 11\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$	5.58	6	6.12	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 8.6\text{V to } 21\text{V}$	5.76	6	6.24	
Line Regulation (Note1)	Regline	$V_I = 8.6\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	-	5	60	mV
		$V_I = 9\text{V to } 13\text{V}$	-	3	60	
		$T_J = +25^{\circ}\text{C}$	$V_I = 8.3\text{V to } 21\text{V}$	-	5	60
			$V_I = 9\text{V to } 13\text{V}$	-	1.5	30
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	-	9	100	mV
		$I_O = 5\text{mA to } 1\text{A}$	-	4	100	
		$I_O = 250\text{mA to } 750\text{mA}$	-	5.0	50	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$	-	4.3	6	mA
Quiescent Current Change	ΔI_Q	$I_O = 5\text{mA to } 1\text{A}$	-	-	0.5	mA
		$V_I = 9\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	-	-	0.8	
		$V_I = 8.5\text{V to } 21\text{V}$, $T_J = +25^{\circ}\text{C}$	-	-	0.8	
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-0.8	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 9\text{V to } 19\text{V}$	-	65	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	-	2	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$	-	17	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7808AE) (Continued)(Refer to the test circuits. $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 14\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$	7.84	8	8.16	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 10.6\text{V to } 23\text{V}$	7.7	8	8.3	
Line Regulation (Note1)	Regline	$V_I = 10.6\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	-	6	80	mV
		$V_I = 11\text{V to } 17\text{V}$	-	3	80	
		$T_J = +25^{\circ}\text{C}$	$V_I = 10.4\text{V to } 23\text{V}$	-	6	80
			$V_I = 11\text{V to } 17\text{V}$	-	2	40
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	-	12	100	mV
		$I_O = 5\text{mA to } 1\text{A}$	-	12	100	
		$I_O = 250\text{mA to } 750\text{mA}$	-	5	50	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$	-	5.0	6	mA
Quiescent Current Change	ΔI_Q	$I_O = 5\text{mA to } 1\text{A}$	-	-	0.5	mA
		$V_I = 11\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	-	-	0.8	
		$V_I = 10.6\text{V to } 23\text{V}$, $T_J = +25^{\circ}\text{C}$	-	-	0.8	
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-0.8	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 11.5\text{V to } 21.5\text{V}$	-	62	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	-	2	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$	-	18	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7809AE) (Continued)(Refer to the test circuits. $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 15\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$	8.82	9.0	9.18	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 11.2\text{V to } 24\text{V}$	8.65	9.0	9.35	
Line Regulation (Note1)	Regline	$V_I = 11.7\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	-	6	90	mV
		$V_I = 12.5\text{V to } 19\text{V}$	-	4	45	
		$T_J = +25^{\circ}\text{C}$	$V_I = 11.5\text{V to } 24\text{V}$	-	6	90
			$V_I = 12.5\text{V to } 19\text{V}$	-	2	45
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.0\text{A}$	-	12	100	mV
		$I_O = 5\text{mA to } 1.0\text{A}$	-	12	100	
		$I_O = 250\text{mA to } 750\text{mA}$	-	5	50	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$	-	5.0	6.0	mA
Quiescent Current Change	ΔI_Q	$V_I = 11.7\text{V to } 25\text{V}$, $T_J = +25^{\circ}\text{C}$	-	-	0.8	mA
		$V_I = 12\text{V to } 25\text{V}$, $I_O = 500\text{mA}$	-	-	0.8	
		$I_O = 5\text{mA to } 1.0\text{A}$	-	-	0.5	
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.0	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 12\text{V to } 22\text{V}$	-	62	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	-	2.0	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$	-	17	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A

Note:

1. Load and line regulation are specified at constant, junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7812AE) (Continued)(Refer to the test circuits. $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 19\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$	11.75	12	12.25	V
		$I_O = 5\text{mA to } 1\text{A}$, $P_O \leq 15\text{W}$ $V_I = 14.8\text{V to } 27\text{V}$	11.5	12	12.5	
Line Regulation (Note1)	Regline	$V_I = 14.8\text{V to } 30\text{V}$, $I_O = 500\text{mA}$	-	10	120	mV
		$V_I = 16\text{V to } 22\text{V}$	-	4	120	
		$T_J = +25^{\circ}\text{C}$	$V_I = 14.5\text{V to } 27\text{V}$	-	10	120
			$V_I = 16\text{V to } 22\text{V}$	-	3	60
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA to } 1.5\text{A}$	-	12	100	mV
		$I_O = 5\text{mA to } 1.0\text{A}$	-	12	100	
		$I_O = 250\text{mA to } 750\text{mA}$	-	5	50	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$	-	5.1	6.0	mA
Quiescent Current Change	ΔI_Q	$V_I = 15\text{V to } 30\text{V}$, $T_J = +25^{\circ}\text{C}$	-		0.8	mA
		$V_I = 14\text{V to } 27\text{V}$, $I_O = 500\text{mA}$	-		0.8	
		$I_O = 5\text{mA to } 1.0\text{A}$	-		0.5	
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.0	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz to } 100\text{kHz}$ $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 14\text{V to } 24\text{V}$	-	60	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	-	2.0	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$	-	18	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7815AE) (Continued)(Refer to the test circuits. $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 23\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$	14.7	15	15.3	V
		$I_O = 5\text{mA}$ to 1A , $P_O \leq 15\text{W}$ $V_I = 17.7\text{V}$ to 30V	14.4	15	15.6	
Line Regulation (Note1)	Regline	$V_I = 17.9\text{V}$ to 30V , $I_O = 500\text{mA}$	-	10	150	mV
		$V_I = 20\text{V}$ to 26V	-	5	150	
		$T_J = +25^{\circ}\text{C}$	$V_I = 17.5\text{V}$ to 30V	-	11	150
			$V_I = 20\text{V}$ to 26V	-	3	75
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA}$ to 1.5A	-	12	100	mV
		$I_O = 5\text{mA}$ to 1.0A	-	12	100	
		$I_O = 250\text{mA}$ to 750mA	-	5	50	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$	-	5.2	6.0	mA
Quiescent Current Change	ΔI_Q	$V_I = 17.5\text{V}$ to 30V , $T_J = +25^{\circ}\text{C}$	-	-	0.8	mA
		$V_I = 17.5\text{V}$ to 30V , $I_O = 500\text{mA}$	-	-	0.8	
		$I_O = 5\text{mA}$ to 1.0A	-	-	0.5	
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.0	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz}$ to 100kHz $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 18.5\text{V}$ to 28.5V	-	58	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	-	2.0	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$	-	19	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7818AE) (Continued)(Refer to the test circuits. $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 27\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$	17.64	18	18.36	V
		$I_O = 5\text{mA}$ to 1A , $P_O \leq 15\text{W}$ $V_I = 21\text{V}$ to 33V	17.3	18	18.7	
Line Regulation (Note1)	Regline	$V_I = 21\text{V}$ to 33V , $I_O = 500\text{mA}$	-	15	180	mV
		$V_I = 21\text{V}$ to 33V	-	5	180	
		$T_J = +25^{\circ}\text{C}$	$V_I = 20.6\text{V}$ to 33V	-	15	180
			$V_I = 24\text{V}$ to 30V	-	5	90
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA}$ to 1.5A	-	15	100	mV
		$I_O = 5\text{mA}$ to 1.0A	-	15	100	
		$I_O = 250\text{mA}$ to 750mA	-	7	50	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$	-	5.2	6.0	mA
Quiescent Current Change	ΔI_Q	$V_I = 21\text{V}$ to 33V , $T_J = +25^{\circ}\text{C}$	-	-	0.8	mA
		$V_I = 21\text{V}$ to 33V , $I_O = 500\text{mA}$	-	-	0.8	
		$I_O = 5\text{mA}$ to 1.0A	-	-	0.5	
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.0	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz}$ to 100kHz $T_A = +25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 22\text{V}$ to 32V	-	57	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	-	2.0	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$	-	19	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Electrical Characteristics (MC7824AE) (Continued)(Refer to the test circuits. $0^{\circ}\text{C} < T_J < 125^{\circ}\text{C}$, $I_O = 1\text{A}$, $V_I = 33\text{V}$, $C_I = 0.33\mu\text{F}$, $C_O = 0.1\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O	$T_J = +25^{\circ}\text{C}$	23.5	24	24.5	V
		$I_O = 5\text{mA}$ to 1A , $P_O \leq 15\text{W}$ $V_I = 27.3\text{V}$ to 38V	23	24	25	
Line Regulation (Note1)	Regline	$V_I = 27\text{V}$ to 38V , $I_O = 500\text{mA}$	-	18	240	mV
		$V_I = 21\text{V}$ to 33V	-	6	240	
		$T_J = +25^{\circ}\text{C}$	$V_I = 26.7\text{V}$ to 38V	-	18	240
			$V_I = 30\text{V}$ to 36V	-	6	120
Load Regulation (Note1)	Regload	$T_J = +25^{\circ}\text{C}$, $I_O = 5\text{mA}$ to 1.5A	-	15	100	mV
		$I_O = 5\text{mA}$ to 1.0A	-	15	100	
		$I_O = 250\text{mA}$ to 750mA	-	7	50	
Quiescent Current	I_Q	$T_J = +25^{\circ}\text{C}$	-	5.2	6.0	mA
Quiescent Current Change	ΔI_Q	$V_I = 27.3\text{V}$ to 38V , $T_J = +25^{\circ}\text{C}$	-	-	0.8	mA
		$V_I = 27.3\text{V}$ to 38V , $I_O = 500\text{mA}$	-	-	0.8	
		$I_O = 5\text{mA}$ to 1.0A	-	-	0.5	
Output Voltage Drift (Note2)	$\Delta V/\Delta T$	$I_O = 5\text{mA}$	-	-1.5	-	mV/ $^{\circ}\text{C}$
Output Noise Voltage	V_N	$f = 10\text{Hz}$ to 100kHz $T_A = 25^{\circ}\text{C}$	-	10	-	$\mu\text{V}/V_O$
Ripple Rejection (Note2)	RR	$f = 120\text{Hz}$, $I_O = 500\text{mA}$ $V_I = 28\text{V}$ to 38V	-	54	-	dB
Dropout Voltage	V_{Drop}	$I_O = 1\text{A}$, $T_J = +25^{\circ}\text{C}$	-	2.0	-	V
Output Resistance (Note2)	r_O	$f = 1\text{kHz}$	-	20	-	$\text{m}\Omega$
Short Circuit Current	I_{SC}	$V_I = 35\text{V}$, $T_A = +25^{\circ}\text{C}$	-	250	-	mA
Peak Current (Note2)	I_{PK}	$T_J = +25^{\circ}\text{C}$	-	2.2	-	A

Note:

1. Load and line regulation are specified at constant junction temperature. Change in V_O due to heating effects must be taken into account separately. Pulse testing with low duty is used.
2. These parameters, although guaranteed, are not 100% tested in production.

Typical Performance Characteristics

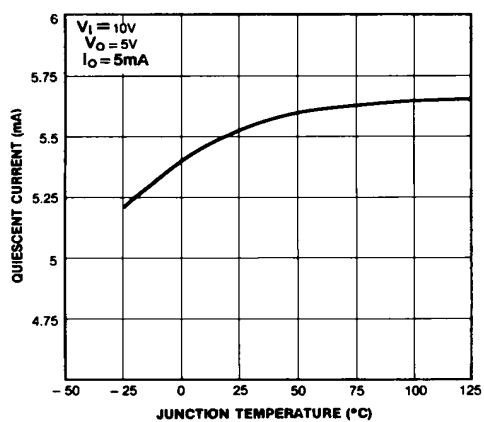


Figure 1. Quiescent Current

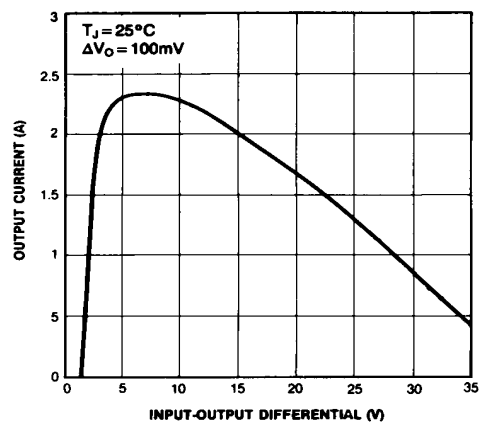


Figure 2. Peak Output Current

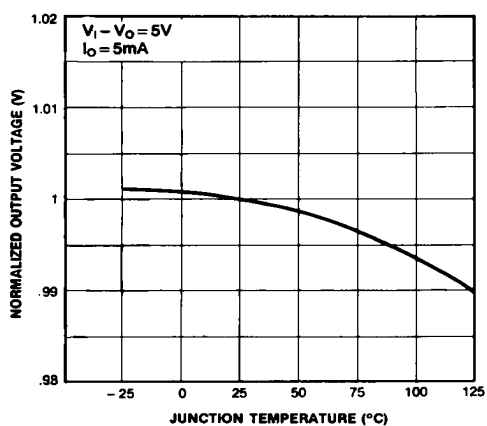


Figure 3. Output Voltage

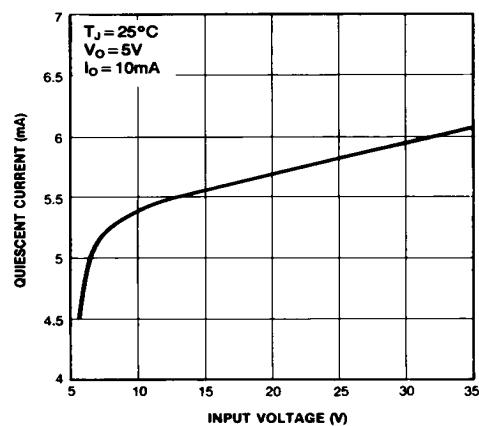


Figure 4. Quiescent Current

Typical Applications

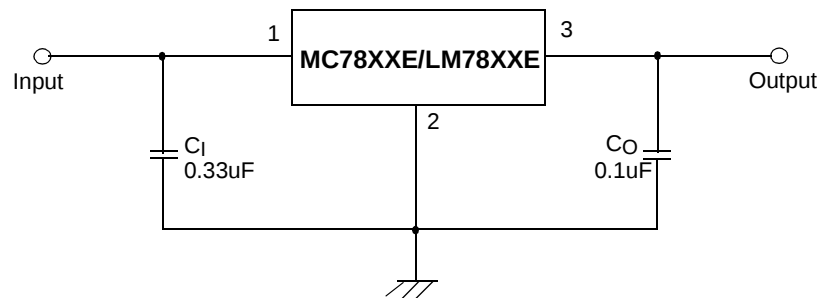


Figure 5. DC Parameters

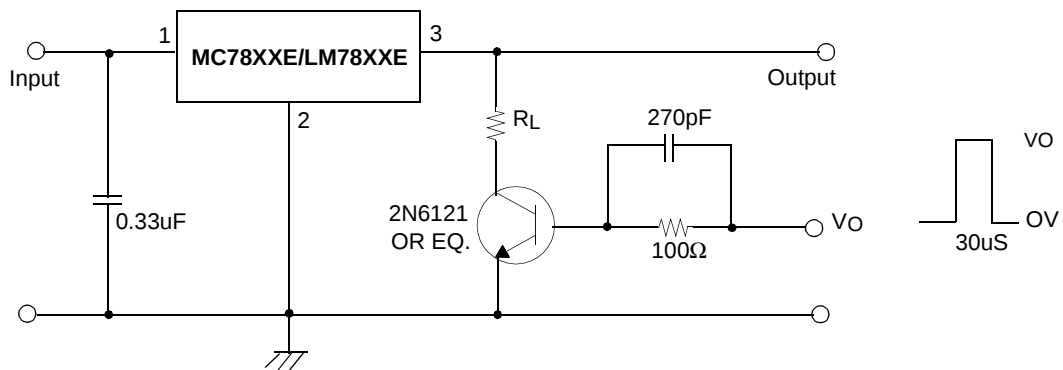


Figure 6. Load Regulation

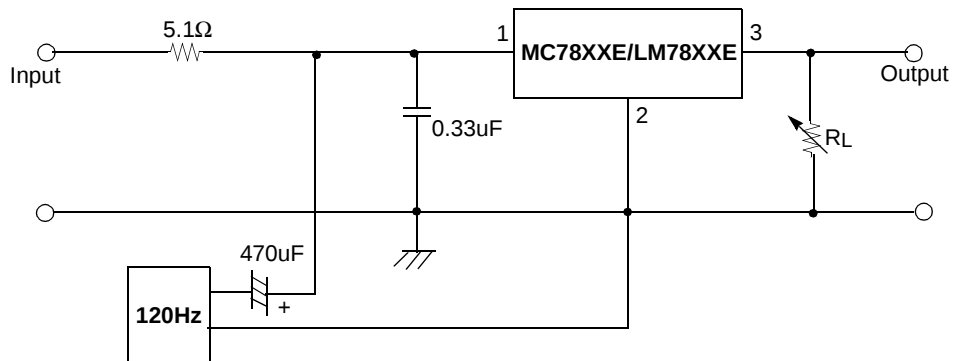


Figure 7. Ripple Rejection

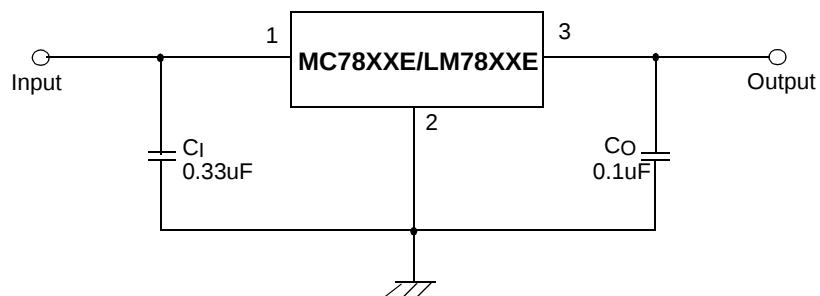


Figure 8. Fixed Output Regulator

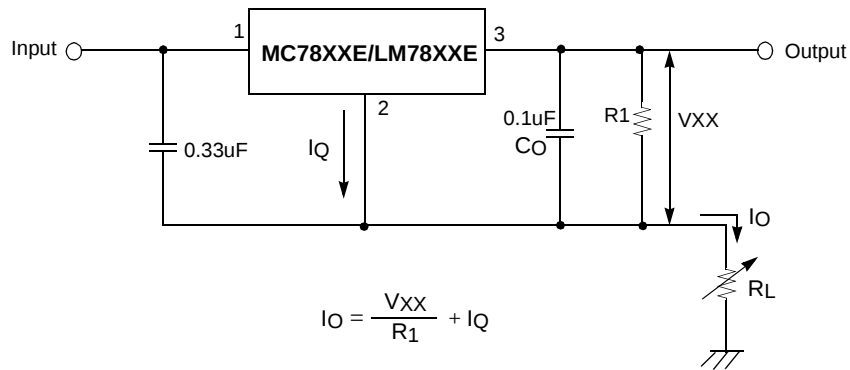


Figure 9. Constant Current Regulator

Notes:

- (1) To specify an output voltage, substitute voltage value for "XX." A common ground is required between the input and the Output voltage. The input voltage must remain typically 2.0V above the output voltage even during the low point on the input ripple voltage.
- (2) C_I is required if regulator is located an appreciable distance from power Supply filter.
- (3) C_O improves stability and transient response.

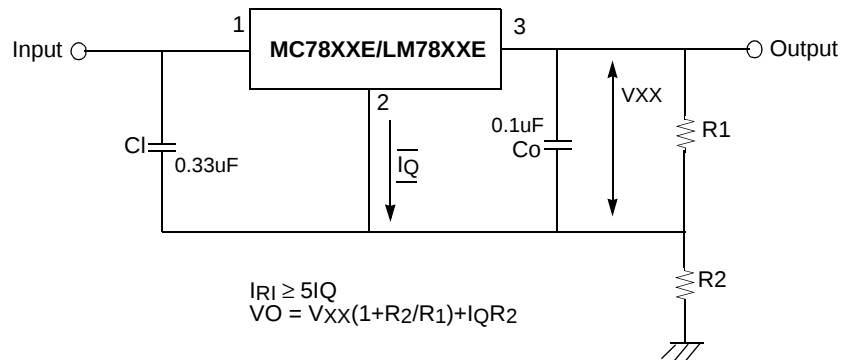


Figure 10. Circuit for Increasing Output Voltage

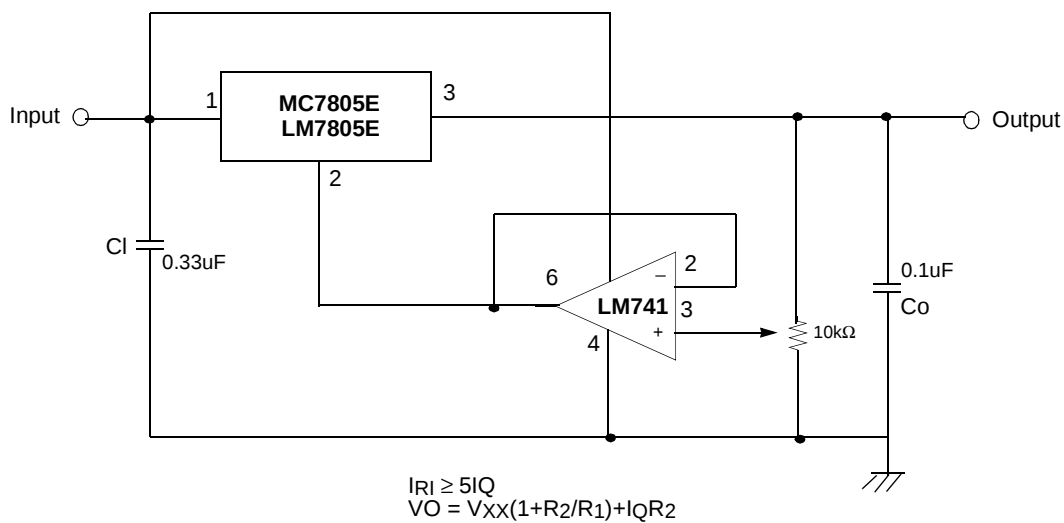


Figure 11. Adjustable Output Regulator (7 to 30V)

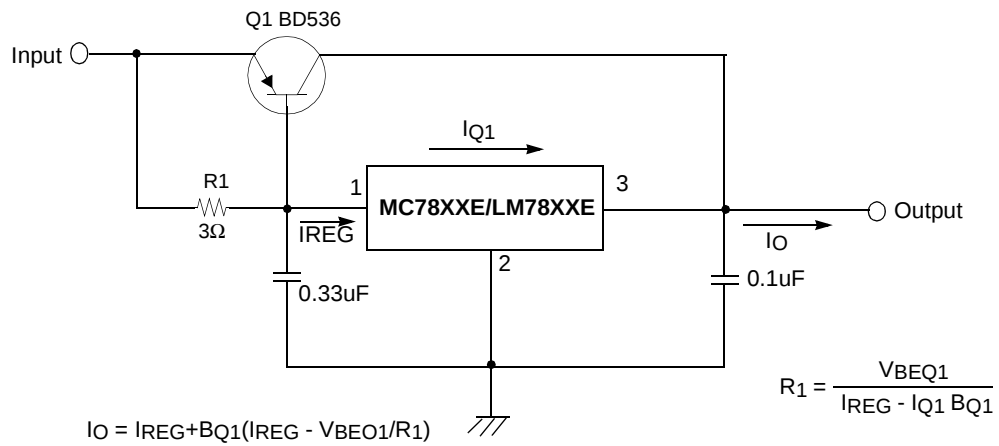


Figure 12. High Current Voltage Regulator

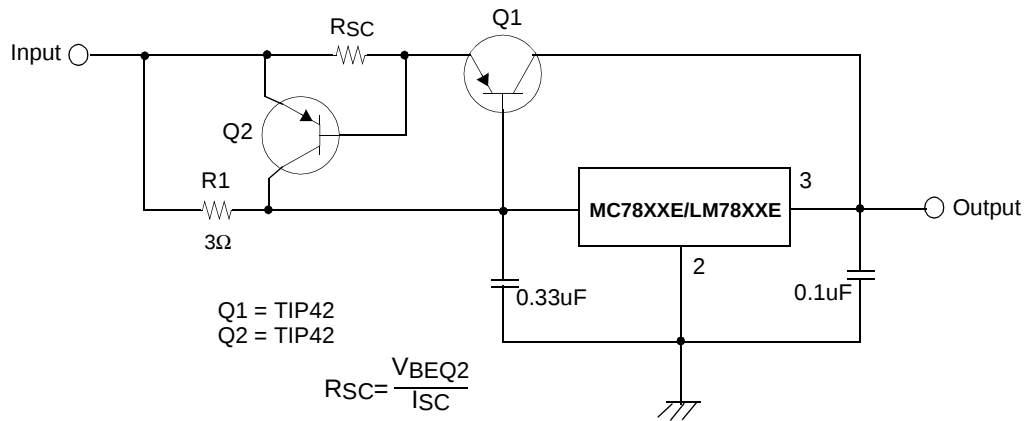


Figure 13. High Output Current with Short Circuit Protection

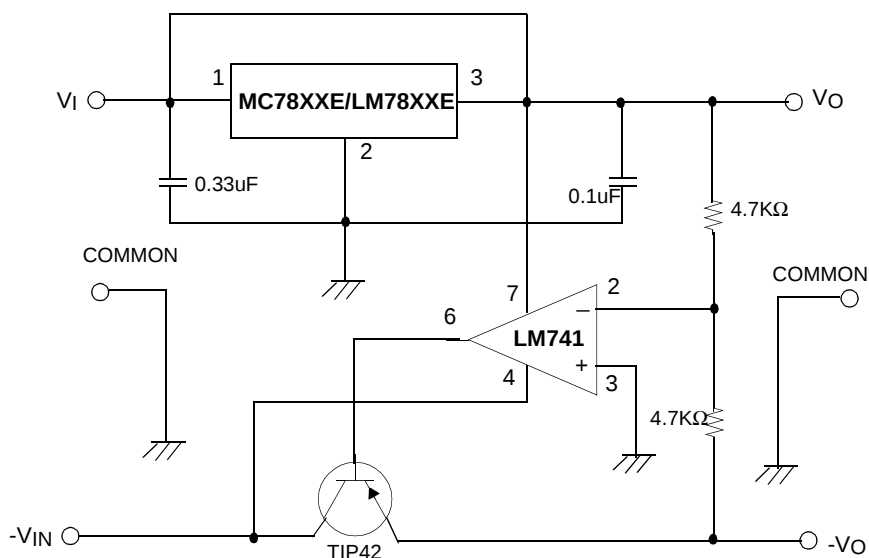


Figure 14. Tracking Voltage Regulator

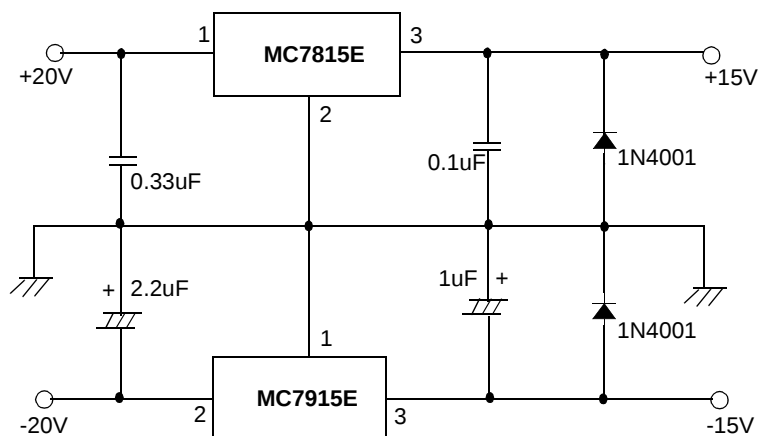


Figure 15. Split Power Supply (±15V-1A)

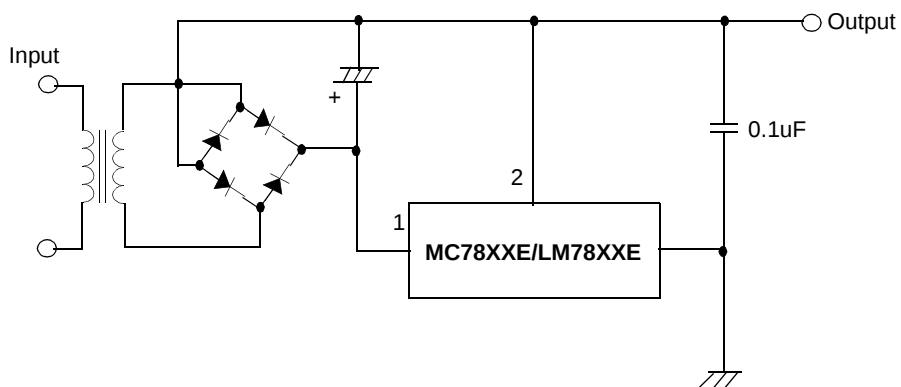


Figure 16. Negative Output Voltage Circuit

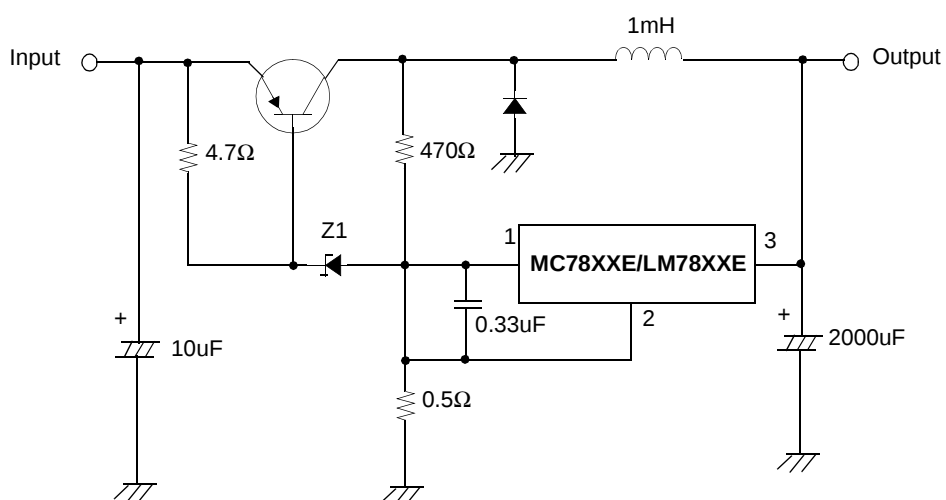


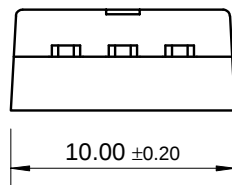
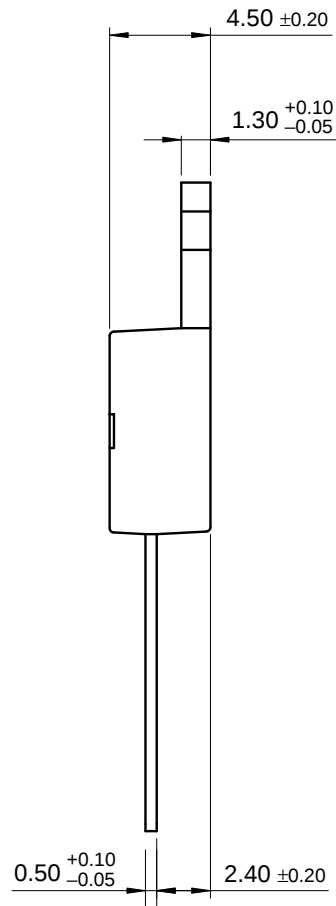
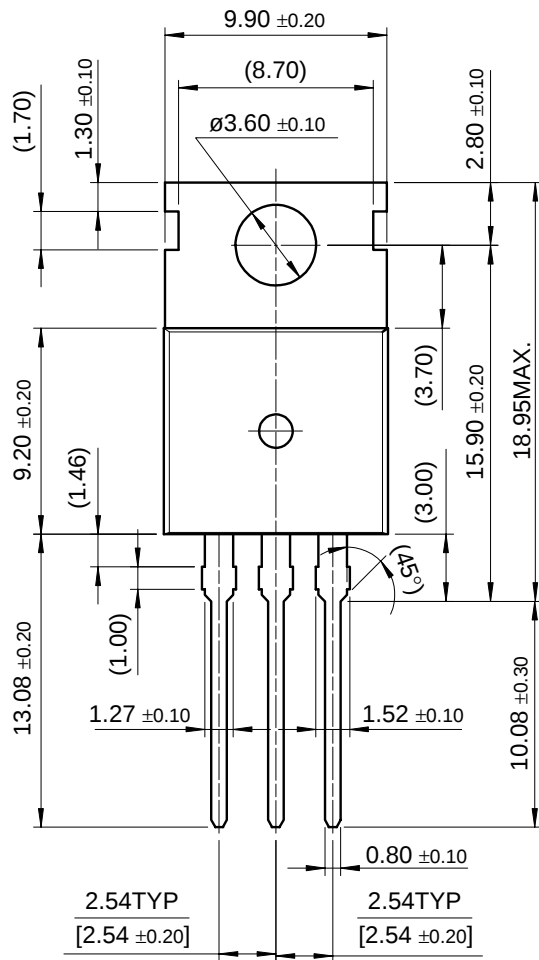
Figure 17. Switching Regulator

Mechanical Dimensions

Package

Dimensions in millimeters

TO-220

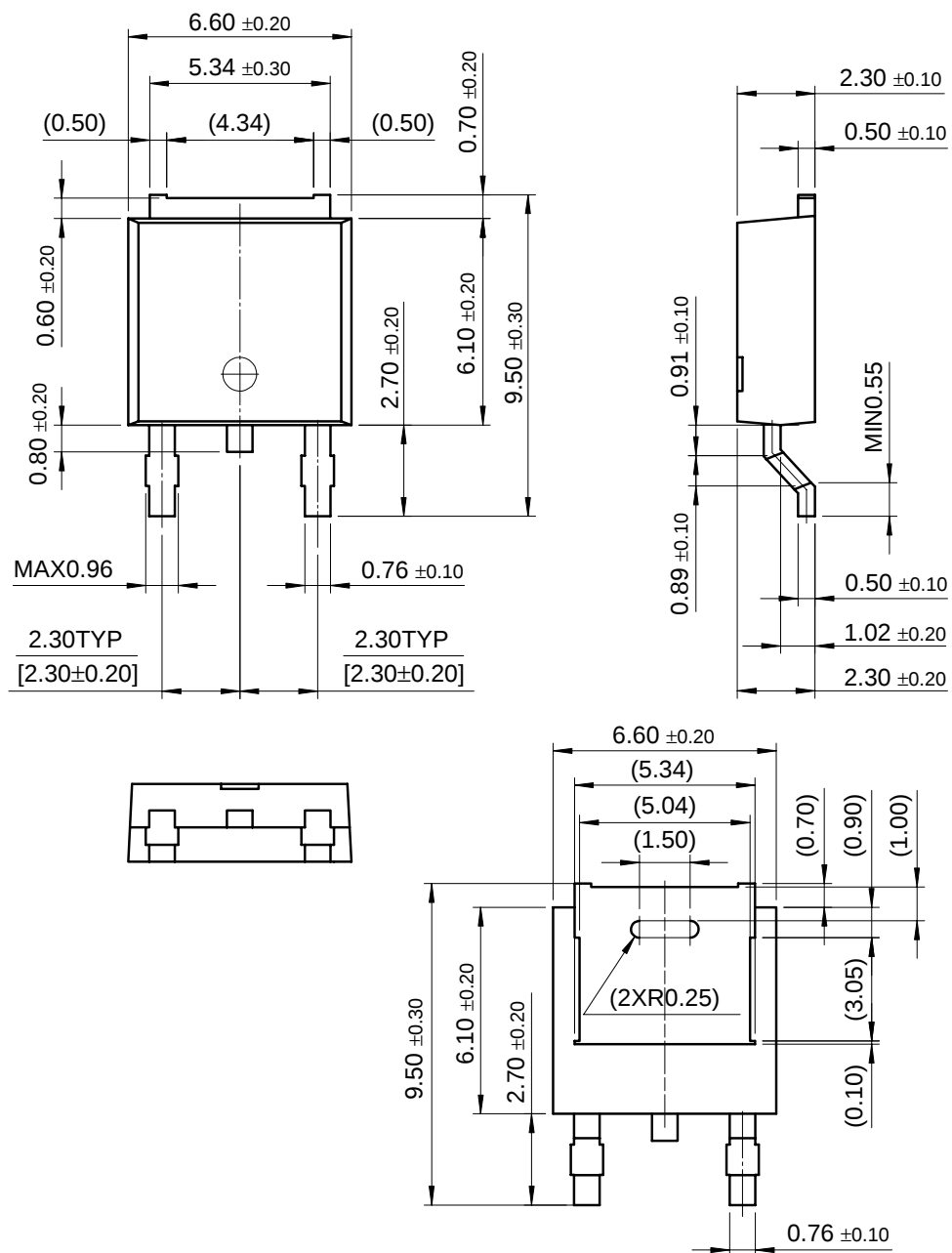


Mechanical Dimensions (Continued)

Package

Dimensions in millimeters

D-PAK



Ordering Information

Product Number	Output Voltage Tolerance	Package	Operating Temperature
LM7805ECT	±4%	TO-220	0 ~ +125°C
Product Number	Output Voltage Tolerance	Package	Operating Temperature
MC7805ECT	±4%	TO-220	0 ~ +125°C
MC7806ECT			
MC7808ECT			
MC7809ECT			
MC7812ECT			
MC7815ECT			
MC7818ECT			
MC7824ECT			
MC7805ECDT		D-PAK	
MC7806ECDT			
MC7808ECDT			
MC7809ECDT			
MC7812ECDT			
MC7805AECT	±2%	TO-220	
MC7806AECT			
MC7808AECT			
MC7809AECT			
MC7812AECT			
MC7815AECT			
MC7818AECT			
MC7824AECT			

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.